Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (Currently Amended): A television tuner comprising:

a first mixer ~~having inputs~~ coupled to a received RF signal for converting the received RF signal to an intermediate frequency signal according to an oscillating signal;

a band-pass filter coupled to the first ~~harmonic~~ mixer for filtering the intermediate frequency signal and thereby generating a filtered intermediate frequency signal;

a first local oscillator operating at a first frequency and providing the oscillating signal to the first mixer, the first frequency is determined by the band-pass filter;

a second ~~harmonic~~ mixer coupled to the band-pass filter for ~~directly~~ converting the filtered intermediate frequency signal to an in-phase baseband signal; and

a third ~~harmonic~~ mixer coupled to the band-pass filter for ~~directly~~ converting the filtered intermediate frequency signal to a quadrature-phase baseband signal[[.]];

wherein at least one of the first mixer, the second mixer and the third mixer is a harmonic mixer.

Claim 2 (Original): The television tuner of claim 1, wherein the first mixer is a harmonic mixer.

Claims 3-4 (Cancelled)

Claim 5 (Currently Amended): The television tuner of ~~claim 4~~ claim 1, wherein the first frequency is variable and determined by the frequency of the received RF signal.

Claims 6-7 (Cancelled)

Claim 8 (Currently Amended): The television tuner of ~~claim 7~~ claim 1, wherein the frequency of the intermediate frequency signal is centered at the center frequency of the bandwidth of the band-pass filter.

Claim 9 (Original): The television tuner of claim 1, wherein the second mixer and the third mixer are harmonic mixers.

Claim 10 (Currently Amended): The television tuner of claim 9, further comprising a second local oscillator operating at a second frequency and providing a third reference signal, a fourth reference signal, a fifth reference signal, and a sixth reference signal, the fourth reference signal being the third reference signal phase shifted by 45 degrees, the fifth reference signal being the third reference signal phase shifted by 90 degrees, and the sixth reference signal being the third reference signal phase shifted by 135 degrees; the second ~~harmonic~~ mixer having inputs coupled to the third reference signal and the fifth reference signal, and the third ~~harmonic~~ mixer having inputs coupled to the fourth reference signal and the sixth reference signal.

Claim 11 (Original): The television tuner of claim 10, wherein the second frequency is determined by the output of the band-pass filter.

Claim 12 (Original): The television tuner of claim 10, wherein the second frequency is fixed.

Claim 13 (Currently Amended): A method of processing a received RF signal, the method comprising:

mixing the received RF signal to produce an intermediate frequency signal, the received RF signal being mixed harmonically with a first reference signal and a second reference signal having a first frequency, the second reference signal being the first reference signal phase shifted by 90 degrees;

varying the first frequency according to the frequency of the received RF signal;

filtering the intermediate frequency signal to produce a pass band signal;

mixing the pass band signal to produce an in-phase baseband signal; and

mixing the pass band signal to produce a quadrature-phase baseband signal.

Claims 14-15 (Cancelled)

Claim 16 (Original): The method of claim 13, wherein the frequency of the intermediate frequency signal is fixed.

Claim 17 (Original): The method of claim 13, wherein the pass band signal is mixed harmonically with a third reference signal and a fifth reference signal to generate the in-phase baseband signal and the pass band signal is mixed harmonically with a fourth reference signal and a sixth reference signal to generate the quadrature-phase baseband signal, wherein the third reference signal, the fourth reference signal, the fifth reference signal, and the sixth reference signal are all have a second frequency, the fourth reference signal being the third reference signal phase shifted by 45 degrees, the fifth reference signal being the third reference signal phase shifted by 90 degrees, and the sixth reference signal being the third reference signal phase shifted by 135 degrees.

Claim 18 (Original): The method of claim 17, wherein the second frequency is determined by the frequency of the pass band signal.

Claim 19 (Original): The method of claim 18, wherein the second frequency is fixed.

Claim 20 (New): The television tuner of claim 2, wherein the oscillating signal comprises a first reference signal and a second reference signal, the second reference signal is the first reference signal phase shifted by 90 degrees.

Claim 21 (New): A television tuner comprising:

a first mixer coupled to a received RF signal for converting the received RF signal to an intermediate frequency signal;

a first local oscillator for providing an oscillating signal except for a differential signal to the first mixer;

a band-pass filter coupled to the first mixer for filtering the intermediate frequency signal and thereby generating a pass band signal;

a second mixer coupled to the band-pass filter for converting the pass band signal to an in-phase baseband signal; and

a third mixer coupled to the band-pass filter for converting the pass band signal to a quadrature-phase baseband signal;

wherein the intermediate frequency signal has a desired channel in the received RF signal according to the center frequency of the bandwidth of the band-pass filter.

Claim 22 (New): The television tuner of claim 21, wherein the oscillating signal comprises a first reference signal and a second reference signal being the first reference signal phase shifted by 90 degrees.

Claim 23 (New): The television tuner of claim 22, further comprising a second local oscillator operating at a second frequency and respectively providing a plurality of reference signals to the second mixer and the third mixer.

Claim 24 (New): The television tuner of claim 23, wherein the first mixer, the second mixer and the third mixer are harmonic mixer.

Claim 25 (New): A television tuner comprising:

a first mixer coupled to a received RF signal for converting the received RF signal to an intermediate frequency signal according to a first reference signal and a second reference signal, the second reference signal being the first reference signal phase shifted by 90 degrees;

a band-pass filter coupled to the first mixer for filtering the intermediate frequency signal and thereby generating a filtered intermediate frequency signal;

a second mixer coupled to the band-pass filter for converting the filtered intermediate frequency signal to an in-phase baseband signal; and

a third mixer coupled to the band-pass filter for converting the filtered intermediate frequency signal to a quadrature-phase baseband signal;

wherein the frequency of the intermediate frequency signal is centered at the center frequency of the bandwidth of the band-pass filter.

Claim 26 (New): The television tuner of claim 25, wherein at least one of the first mixer, the second mixer and the third mixer is a harmonic mixer.

Claim 27 (New): A television tuner comprising:

a first mixer coupled to a received RF signal for converting the received RF signal to an intermediate frequency signal according to an oscillating signal;

a first local oscillator for providing the oscillating signal to the first mixer;

a band-pass filter coupled to the first mixer for filtering the intermediate frequency signal and thereby generating a filtered intermediate frequency signal; and

a mixing unit coupled to the band-pass filter for converting the filtered intermediate frequency signal to a baseband signal;

wherein the frequency range of the oscillating signal is narrower than the frequency range of the received RF signal.

Claim 28 (New): The television tuner of claim 27, wherein the mixing unit comprises:

a second mixer coupled to the band-pass filter for converting the filtered intermediate frequency signal to an in-phase baseband signal; and

a third mixer coupled to the band-pass filter for converting the filtered intermediate frequency signal to a quadrature-phase baseband signal;

Claim 29 (New): The television tuner of claim 28, wherein at least one of the first mixer, the second mixer and the third mixer is a harmonic mixer.

Claim 30 (New): The television tuner of claim 27, wherein the frequency of the oscillating signal is lower than the frequency of the filtered intermediate frequency signal.

Claim 31 (New): The television tuner of claim 27, wherein the frequency range of the received RF signal is a multiple of the frequency range of the oscillating signal.

Claim 32 (New): The television tuner of claim 31, wherein the frequency range of the oscillating signal is one half of the frequency range of the received RF signal.